FIG.1

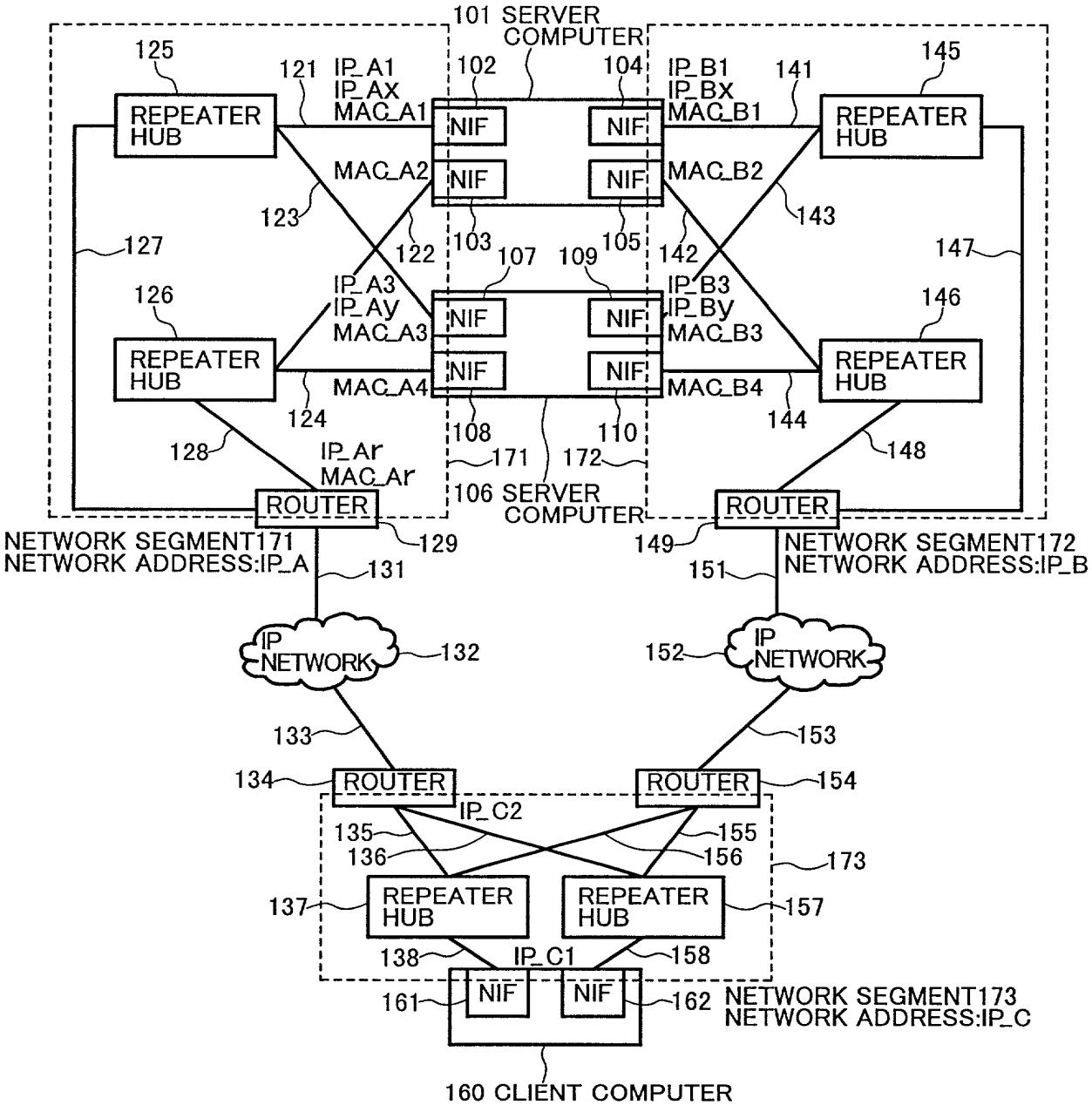
101 SERVER COMPUTER
125
121 IP_A1
IP_AX
MAC_A1
102
104
IP_B1
IP_BX
MAC_B1
141
145
REPEATER HUB
NIF
NIF
REPEATER HUB
MAC_A2
NIF
NIF
MAC_B2
123
143
127
122
103
107
109
105
142
147
IP_A3
IP_Ay
MAC_A3
IP_B3
IP_By
MAC_B3
126
146
REPEATER HUB
NIF
NIF
REPEATER HUB
MAC_A4
NIF
NIF
MAC_B4
124
108
110
144
128
IP_Ar
MAC_Ar
171
172
148
106 SERVER COMPUTER
ROUTER
ROUTER
NETWORK SEGMENT171
NETWORK ADDRESS:IP_A
129
149
NETWORK SEGMENT172
NETWORK ADDRESS:IP_B
131
151
IP NETWORK
132
152
IP NETWORK
133
153
134
ROUTER
ROUTER
154
IP_C2
135
155
136
156
173
137
REPEATER HUB
REPEATER HUB
157
138
IP_C1
158
161
NIF
NIF
162
NETWORK SEGMENT173
NETWORK ADDRESS:IP_C
160 CLIENT COMPUTER

FIG.2

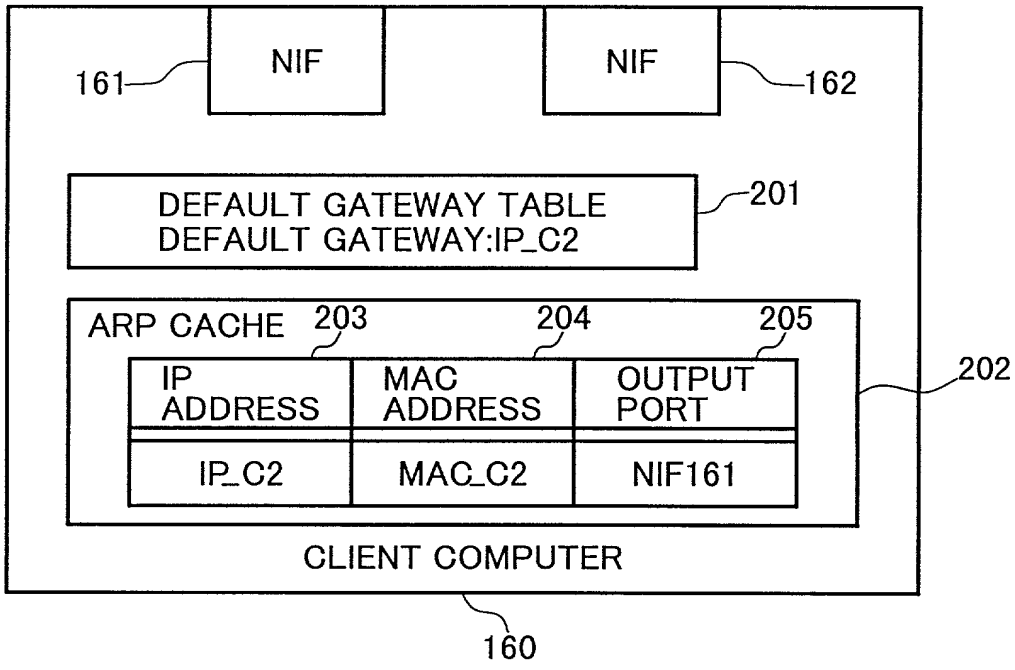
161
NIF
NIF
162
DEFAULT GATEWAY TABLE
DEFAULT GATEWAY:IP_C2
201
ARP CACHE
203
204
205
IP ADDRESS
MAC ADDRESS
OUTPUT PORT
IP_C2
MAC_C2
NIF161
202
CLIENT COMPUTER
160

FIG.3

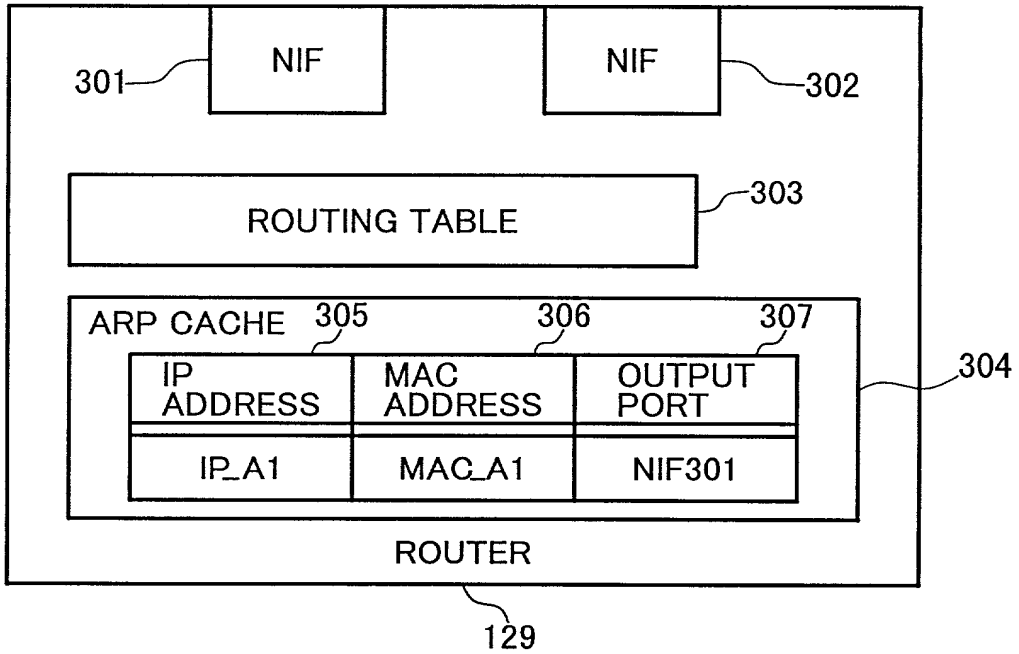
301
NIF
NIF
302
ROUTING TABLE
303
ARP CACHE
305
306
307
IP ADDRESS
MAC ADDRESS
OUTPUT PORT
IP_A1
MAC_A1
NIF301
304
ROUTER
129

FIG.4

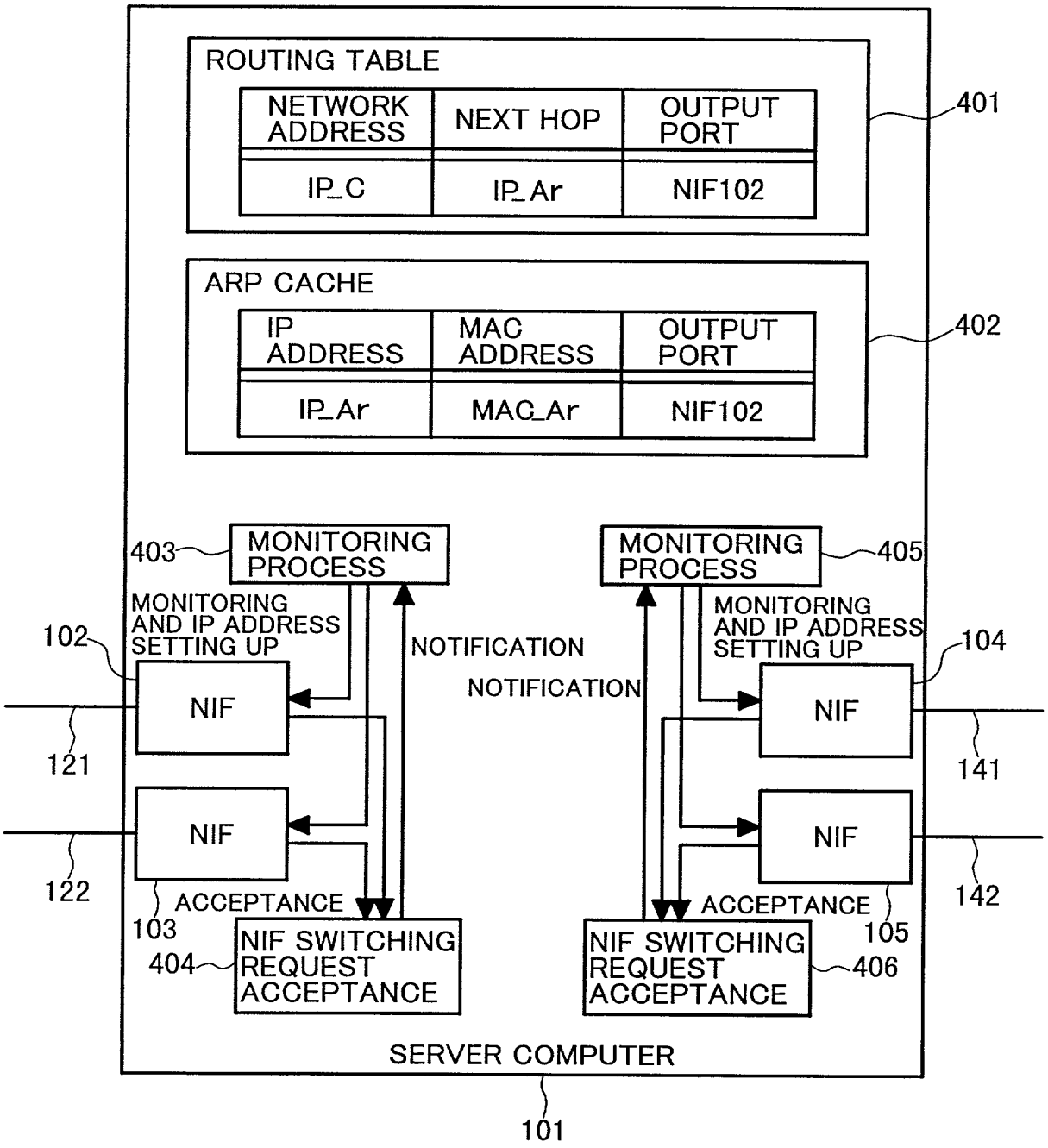
ROUTING TABLE
NETWORK ADDRESS
NEXT HOP
OUTPUT PORT
IP_C
IP_Ar
NIF102
401
ARP CACHE
IP ADDRESS
MAC ADDRESS
OUTPUT PORT
IP_Ar
MAC_Ar
NIF102
402
403
MONITORING PROCESS
405
MONITORING PROCESS
MONITORING AND IP ADDRESS SETTING UP
NOTIFICATION
NOTIFICATION
MONITORING AND IP ADDRESS SETTING UP
102
104
NIF
NIF
121
141
NIF
NIF
122
142
ACCEPTANCE
ACCEPTANCE
103
105
404
NIF SWITCHING REQUEST ACCEPTANCE
NIF SWITCHING REQUEST ACCEPTANCE
406
SERVER COMPUTER
101

FIG.5

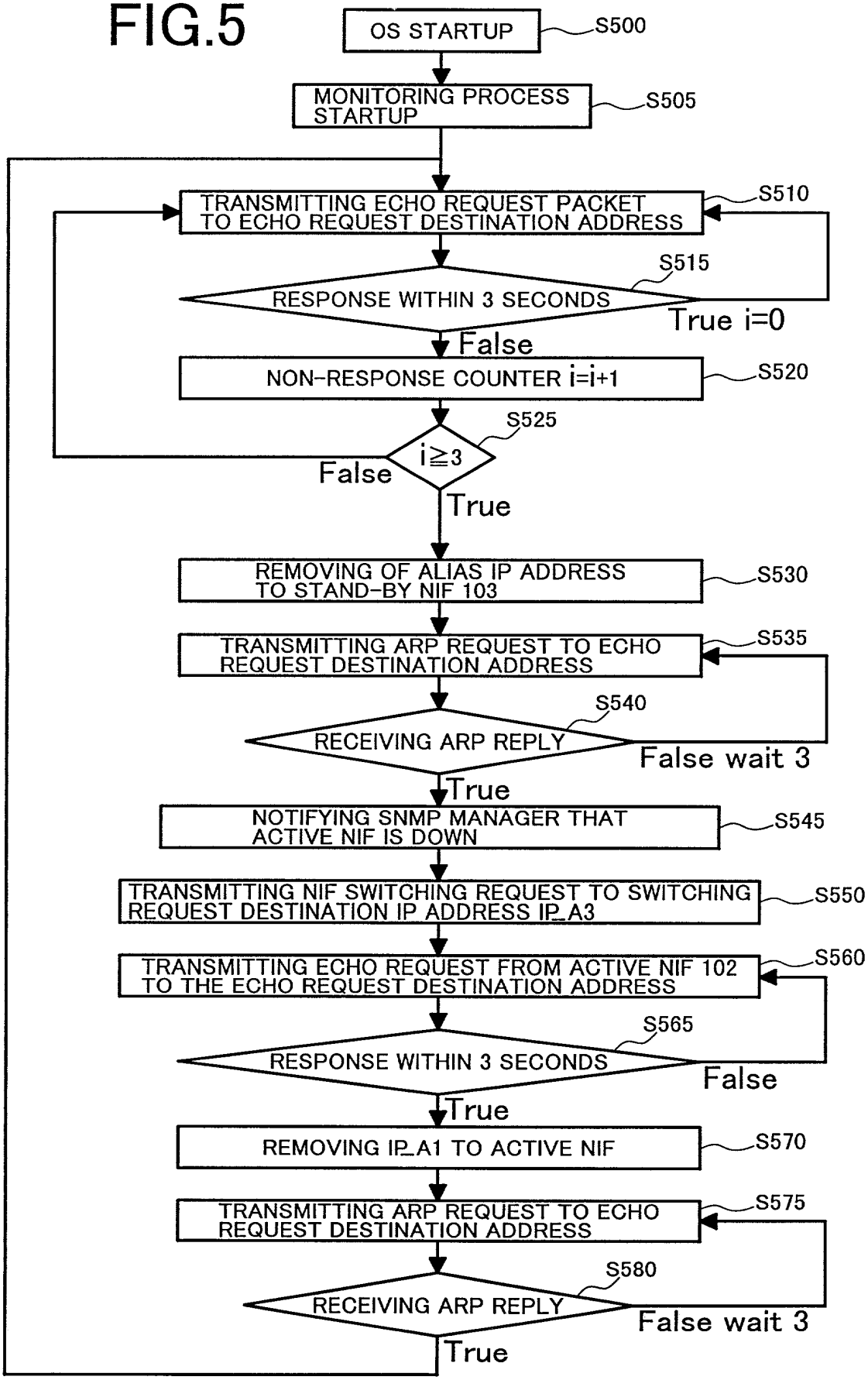
OS STARTUP
S500
MONITORING PROCESS STARTUP
S505
TRANSMITTING ECHO REQUEST PACKET TO ECHO REQUEST DESTINATION ADDRESS
S510
RESPONSE WITHIN 3 SECONDS
S515
True i=0
False
NON-RESPONSE COUNTER i=i+1
S520
i≧3
S525
False
True
REMOVING OF ALIAS IP ADDRESS TO STAND-BY NIF 103
S530
TRANSMITTING ARP REQUEST TO ECHO REQUEST DESTINATION ADDRESS
S535
RECEIVING ARP REPLY
S540
False wait 3
True
NOTIFYING SNMP MANAGER THAT ACTIVE NIF IS DOWN
S545
TRANSMITTING NIF SWITCHING REQUEST TO SWITCHING REQUEST DESTINATION IP ADDRESS IP_A3
S550
TRANSMITTING ECHO REQUEST FROM ACTIVE NIF 102 TO THE ECHO REQUEST DESTINATION ADDRESS
S560
RESPONSE WITHIN 3 SECONDS
S565
False
True
REMOVING IP_A1 TO ACTIVE NIF
S570
TRANSMITTING ARP REQUEST TO ECHO REQUEST DESTINATION ADDRESS
S575
RECEIVING ARP REPLY
S580
False wait 3
True

FIG.6

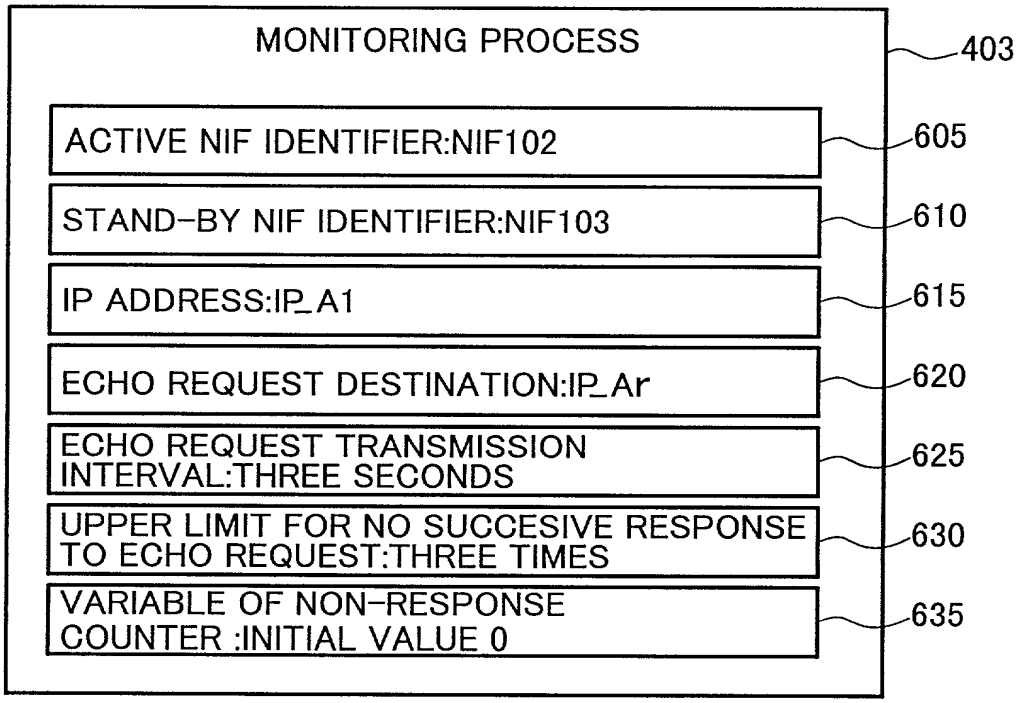
MONITORING PROCESS
403
ACTIVE NIF IDENTIFIER:NIF102
605
STAND-BY NIF IDENTIFIER:NIF103
610
IP ADDRESS:IP_A1
615
ECHO REQUEST DESTINATION:IP_Ar
620
ECHO REQUEST TRANSMISSION INTERVAL:THREE SECONDS
625
UPPER LIMIT FOR NO SUCCESIVE RESPONSE TO ECHO REQUEST:THREE TIMES
630
VARIABLE OF NON-RESPONSE COUNTER :INITIAL VALUE 0
635

FIG.7

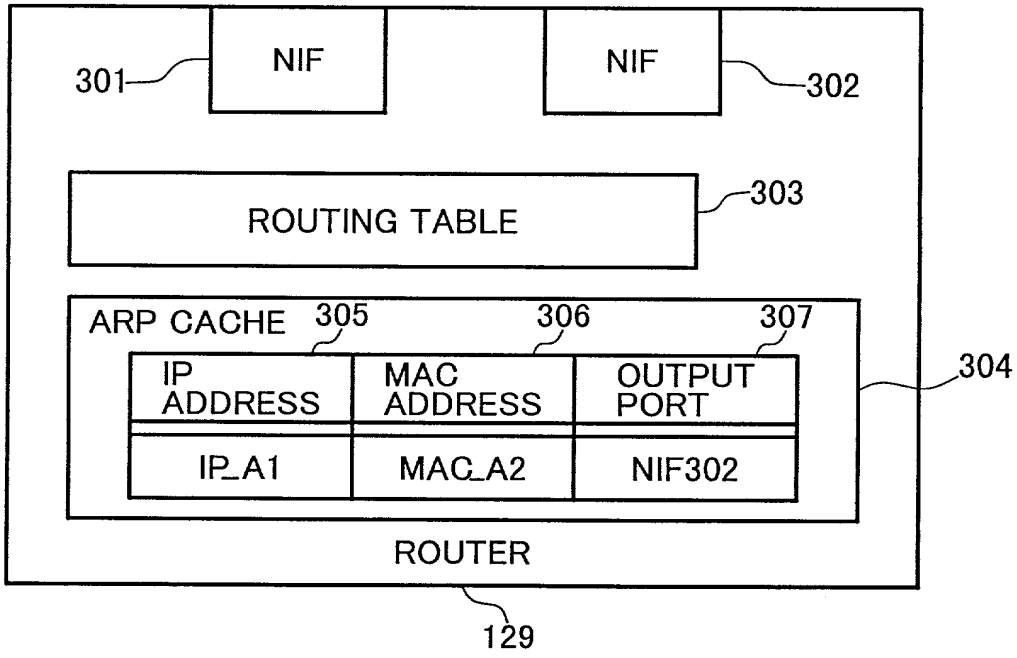
301
NIF
NIF
302
ROUTING TABLE
303
ARP CACHE
305
306
307
IP ADDRESS
MAC ADDRESS
OUTPUT PORT
IP_A1
MAC_A2
NIF302
304
ROUTER
129

FIG.8

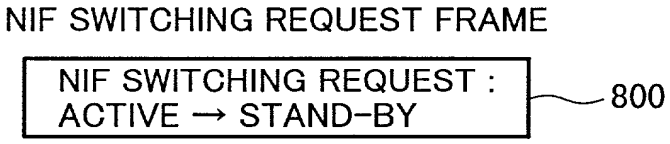
NIF SWITCHING REQUEST FRAME
NIF SWITCHING REQUEST :
ACTIVE → STAND-BY
800

FIG.9

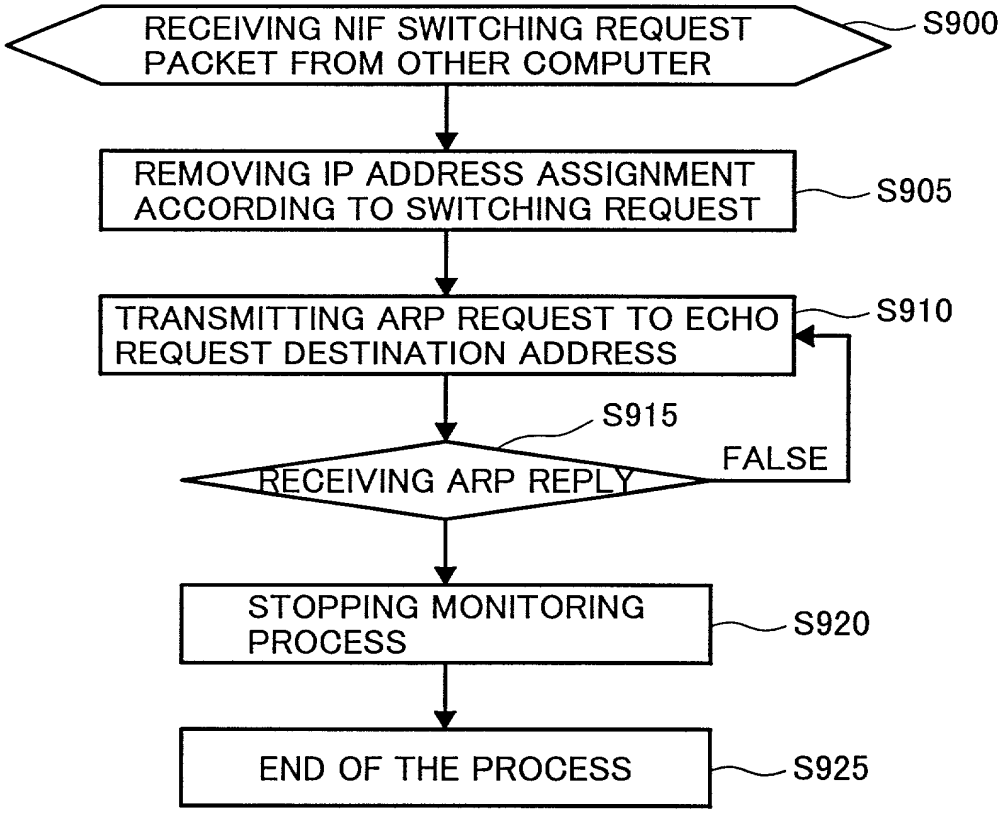
RECEIVING NIF SWITCHING REQUEST PACKET FROM OTHER COMPUTER
S900
REMOVING IP ADDRESS ASSIGNMENT ACCORDING TO SWITCHING REQUEST
S905
TRANSMITTING ARP REQUEST TO ECHO REQUEST DESTINATION ADDRESS
S910
S915
RECEIVING ARP REPLY
FALSE
STOPPING MONITORING PROCESS
S920
END OF THE PROCESS
S925

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FIG.10

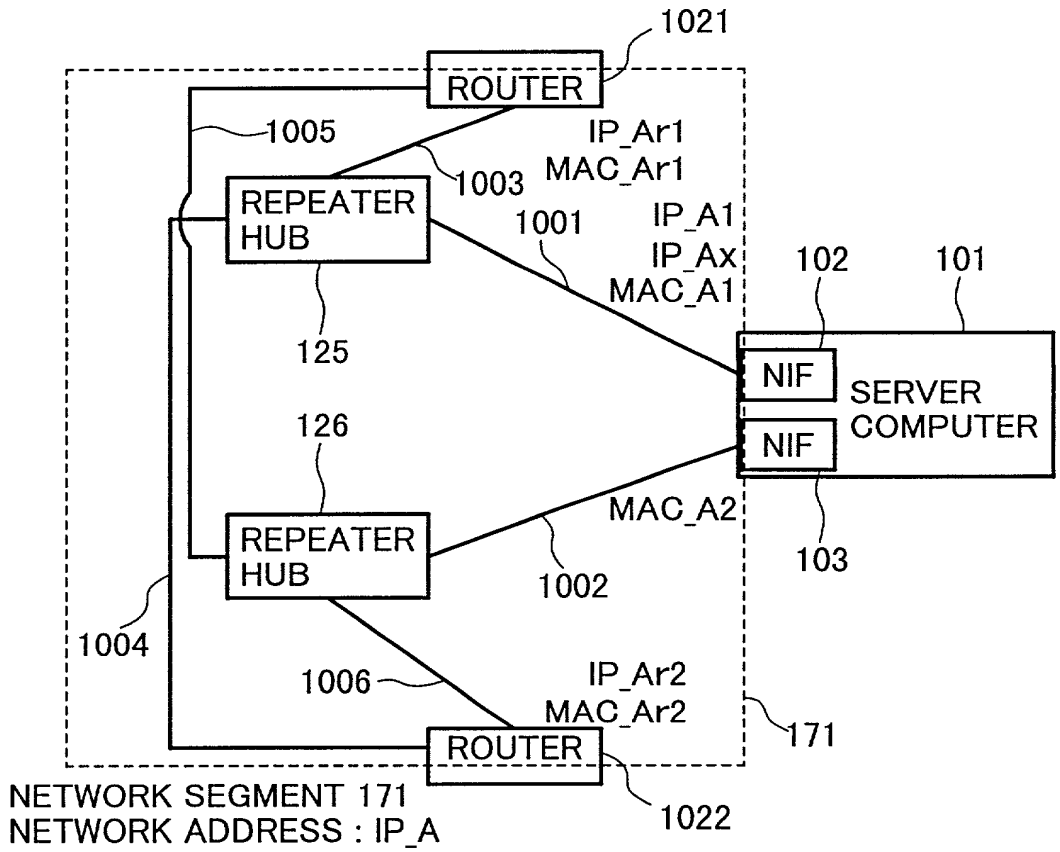

1021
ROUTER
1005
IP_Ar1
MAC_Ar1
1003
REPEATER HUB
1001
IP_A1
IP_Ax
MAC_A1
102
101
125
NIF
SERVER COMPUTER
NIF
126
MAC_A2
REPEATER HUB
1002
103
1004
1006
IP_Ar2
MAC_Ar2
171
ROUTER
1022
NETWORK SEGMENT 171
NETWORK ADDRESS : IP_A

FIG.11

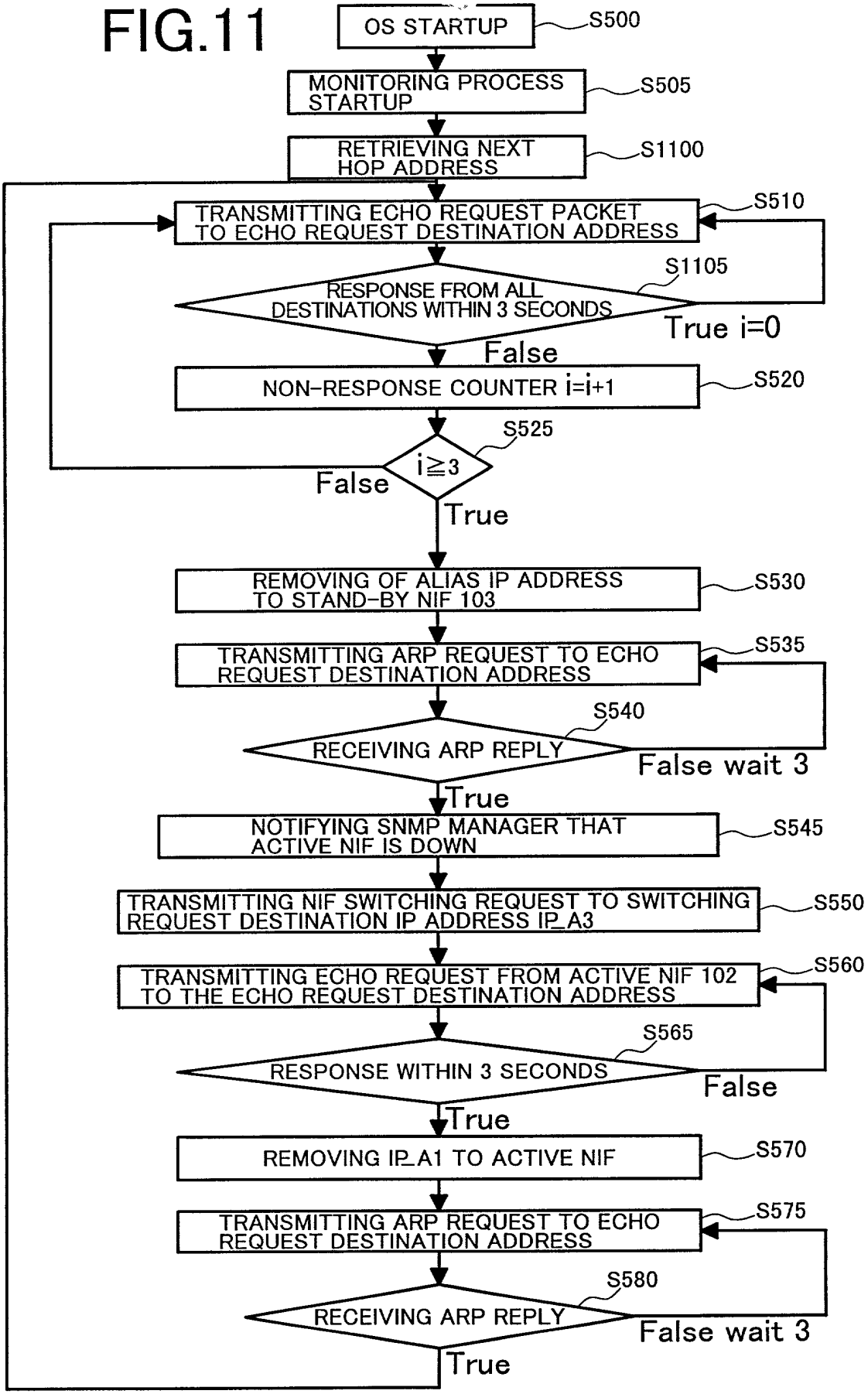

OS STARTUP
S500
MONITORING PROCESS STARTUP
S505
RETRIEVING NEXT HOP ADDRESS
S1100
TRANSMITTING ECHO REQUEST PACKET TO ECHO REQUEST DESTINATION ADDRESS
S510
RESPONSE FROM ALL DESTINATIONS WITHIN 3 SECONDS
S1105
True i=0
False
NON-RESPONSE COUNTER i=i+1
S520
i≧3
S525
False
True
REMOVING OF ALIAS IP ADDRESS TO STAND-BY NIF 103
S530
TRANSMITTING ARP REQUEST TO ECHO REQUEST DESTINATION ADDRESS
S535
RECEIVING ARP REPLY
S540
False wait 3
True
NOTIFYING SNMP MANAGER THAT ACTIVE NIF IS DOWN
S545
TRANSMITTING NIF SWITCHING REQUEST TO SWITCHING REQUEST DESTINATION IP ADDRESS IP_A3
S550
TRANSMITTING ECHO REQUEST FROM ACTIVE NIF 102 TO THE ECHO REQUEST DESTINATION ADDRESS
S560
RESPONSE WITHIN 3 SECONDS
S565
False
True
REMOVING IP_A1 TO ACTIVE NIF
S570
TRANSMITTING ARP REQUEST TO ECHO REQUEST DESTINATION ADDRESS
S575
RECEIVING ARP REPLY
S580
False wait 3
True

FIG.12

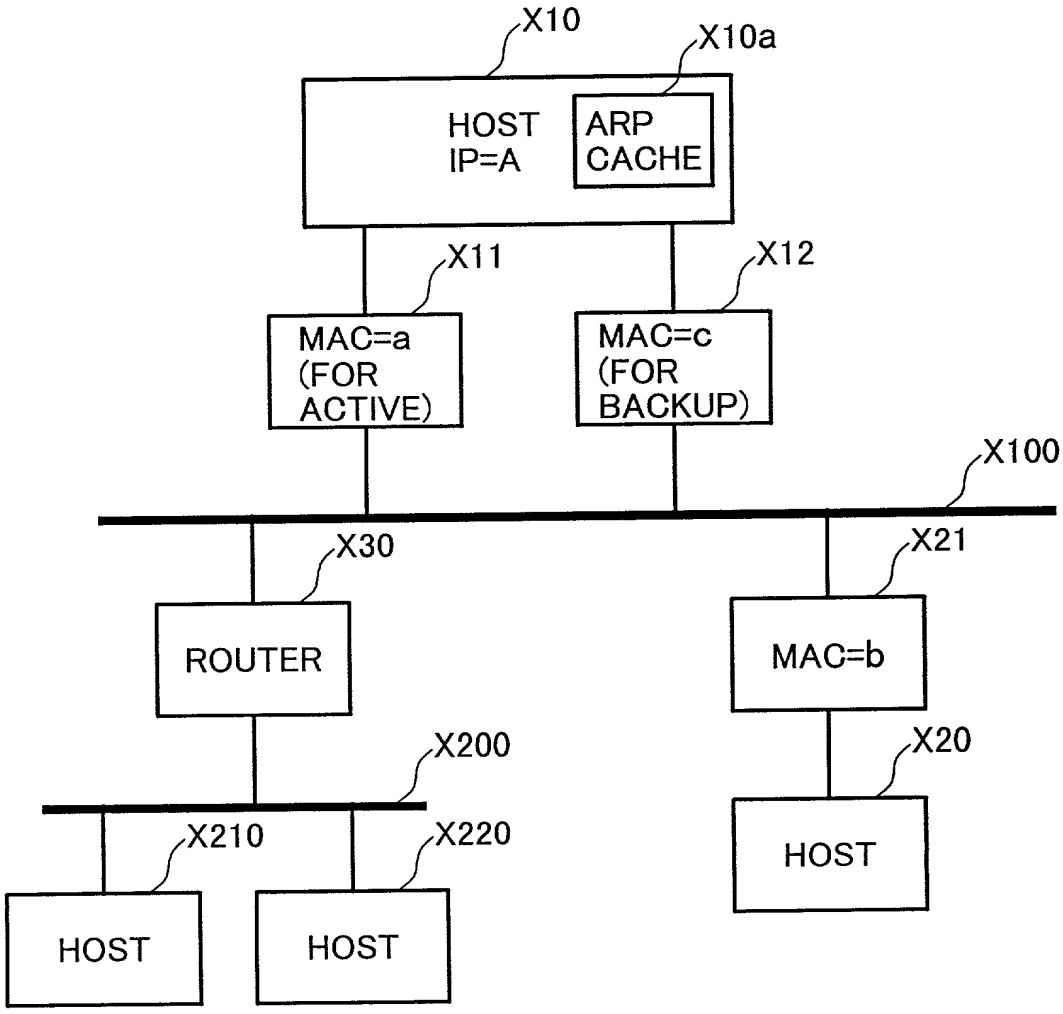
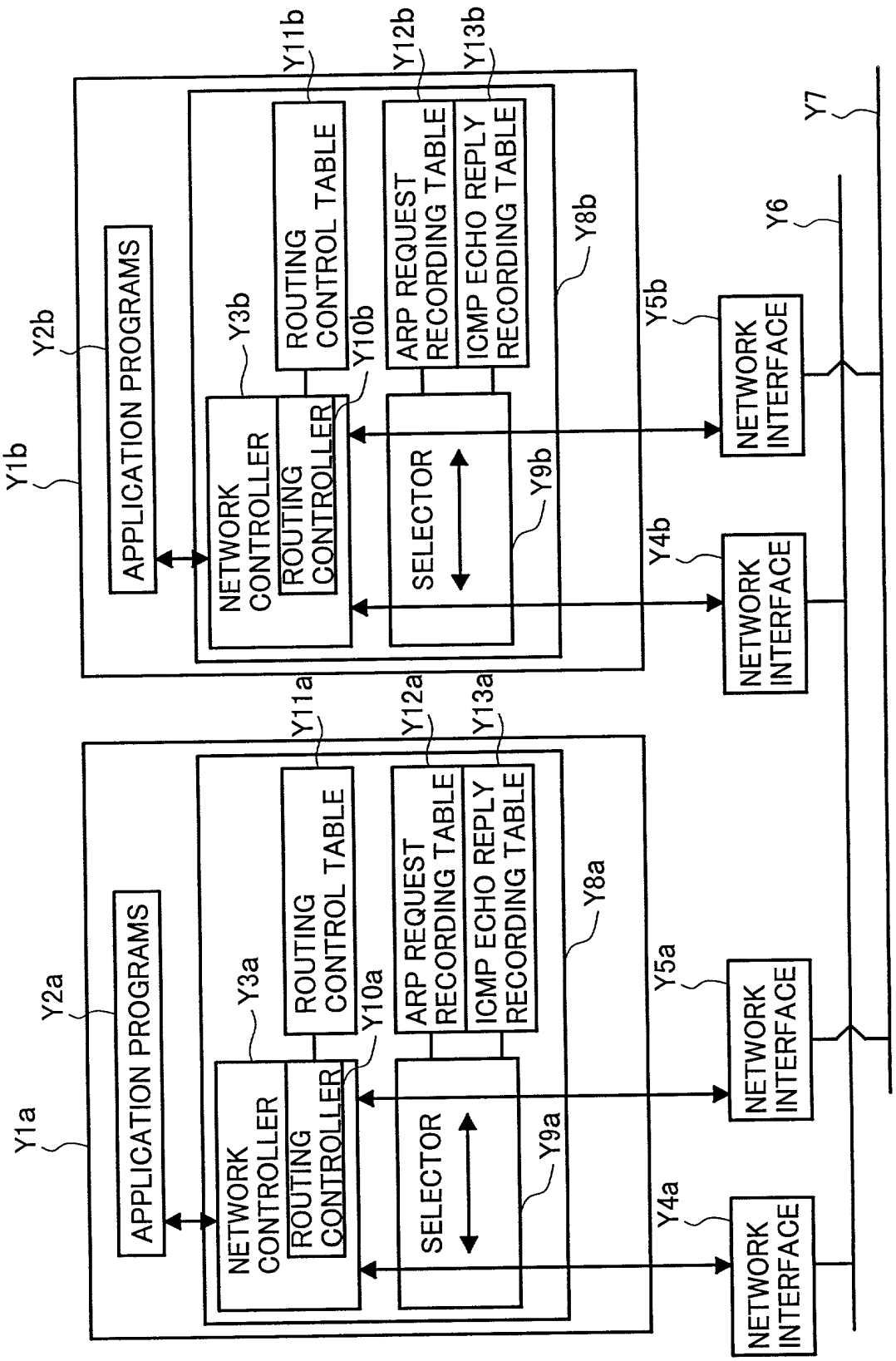

X10
X10a
HOST
IP=A
ARP
CACHE
X11
X12
MAC=a
(FOR
ACTIVE)
MAC=c
(FOR
BACKUP)
X100
X30
X21
ROUTER
MAC=b
X200
X20
X210
X220
HOST
HOST
HOST

FIG.13


Y1a
Y2a
APPLICATION PROGRAMS
Y3a
NETWORK CONTROLLER
ROUTING CONTROLLER
Y10a
Y11a
ROUTING CONTROL TABLE
Y12a
ARP REQUEST RECORDING TABLE
Y13a
ICMP ECHO REPLY RECORDING TABLE
Y8a
SELECTOR
Y9a
Y4a
NETWORK INTERFACE
Y5a
NETWORK INTERFACE
Y1b
Y2b
APPLICATION PROGRAMS
Y3b
NETWORK CONTROLLER
ROUTING CONTROLLER
Y10b
Y11b
ROUTING CONTROL TABLE
Y12b
ARP REQUEST RECORDING TABLE
Y13b
ICMP ECHO REPLY RECORDING TABLE
Y8b
SELECTOR
Y9b
Y4b
NETWORK INTERFACE
Y5b
NETWORK INTERFACE
Y6
Y7